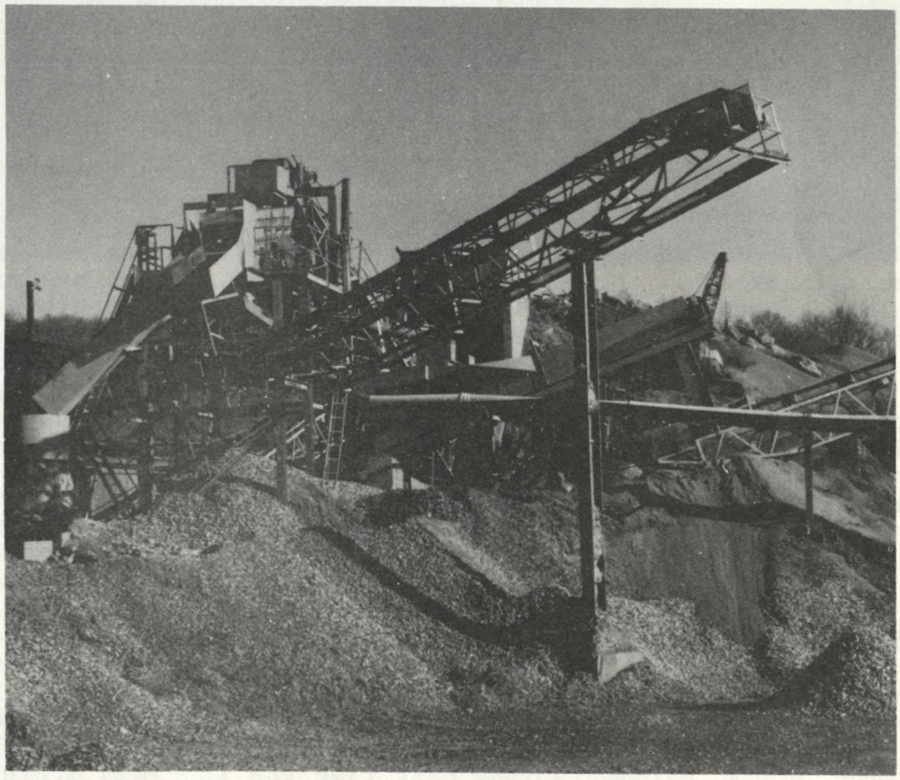
En 90
Cb Vol. 13
No. 5
Item 10B

Citizens' Bulletin

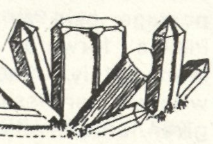
Volume 13 Number ~~5~~ 6 February 1986 $5/yr.
The Connecticut Department of Environmental Protection

Conn. Documents
CONN. COLLEGE LIBRARY
MAR 26 '86
NEW LONDON, CONN.

Our Mineral Resources



The impact of the mining industry on our state



Citizens' Bulletin

February 1986
Volume 13, Number 6 **$5/year**

Features

3 **Mining in Connecticut**
Robert Altamura
10 **Comprehensive Wildlife Program**
Joey Corcoran
12 **Bartlett Arboretum**
Martha Kelly
16 **Groundwater Protection**
Jim Murphy

Departments

2 **The Wider View**
7 **Wildlife Info Series**
15 **FYI**
19 **The Bulletin Board**
20 **Trailside Botanizer**
23 **The Night Sky**
23 **Letters**

Cover:
Mineral Processing Plant in Glastonbury,
(Photo: Robert Paier)

Commissioner
Stanley J. Pac
Director Info & Ed
William Delaney
Editor
Robert Paier
Graphics
Rosemary Gutbrod
Composition
Caryn Alleva
Circulation
Olive Tyghter
Phone
566-5524

DEP Citizens' Bulletin
(USPS 041-570)

Published 11 times a year by the Department of Environmental Protection. Yearly subscription, $5.00; two years, $9.00. Second class postage paid at Hartford, Connecticut. Please forward any address change immediately. Material may be reprinted without permission provided credit is given, unless otherwise noted. Address communications to Ed., **DEP Citizens' Bulletin**, Dept. of Environmental Protection, Rm. 112, State Office Bldg. Hartford, CT 06106

The Wider View

Better Mining, Better Management

by Sidney Quarrier,
Principal Environmental Analyst,
Natural Resources Center

Most of us think very little about mining. It is geographically and culturally removed from us. Mining occurs in "distant places," and we deal with manufactured end-products, not with the raw materials of the mining industry. Our view of mining tends to prevent us from seeing some important aspects of its character and of our relationship to it.

Whether we realize it or not, we are hooked. Ours is a minerals-based economy. We are totally dependent on minerals and fuels to sustain our way of life. A break in the steady flow of these materials causes significant disruptions. At the same time, we tend to think of mineral and fuel resources as inexhaustable. Opportunities for conservation and recycling can significantly change our dependence and lessen our consumption of finite resources, but these opportunities have been extremely difficult for us to realize.

Mining is a problematical activity. It produces the minerals and fuels that we need, but often at the cost of significant impacts to the land and to our ecosystem. The distance we maintain between ourselves and mining activities insulates us so that we rarely experience its direct effects. Usually we are unaware of these impacts. When a mining activity is proposed in our neighborhood, we react with predictable swiftness. To a great extent the impacts of mining can be minimized through careful management of the mining process, and a small increase in raw material prices will cover the cost. Improved management of mining requires interest and commitment by a number of parts of our society. As consumers, we have not only the opportunity but possibly a special responsibility to act, for much of the world's mining is conducted to support our high level of consumption.

These characteristics of mining and our relationship to it also apply in Connecticut. The next time the sand and gravel truck rolls by, consider our dependence on this material to build and maintain our roads, buildings, and other parts of the infrastructure. Consider also our ability to better manage the mining process so that the impact on the land is reduced. Silted streams and orphaned mine-lands are unnecessary. Finally, consider that sand and gravel is limited in supply and that it often occupies the land that is best for farming and for general development.

We need mining and we need to manage it better. ■

A typical traprock quarry in Connecticut's Central Valley.

Connecticut's Mineral Resources

Text and photos by Robert Altamura, Geologist,
Connecticut Geological and Natural History Survey,
Natural Resources Center

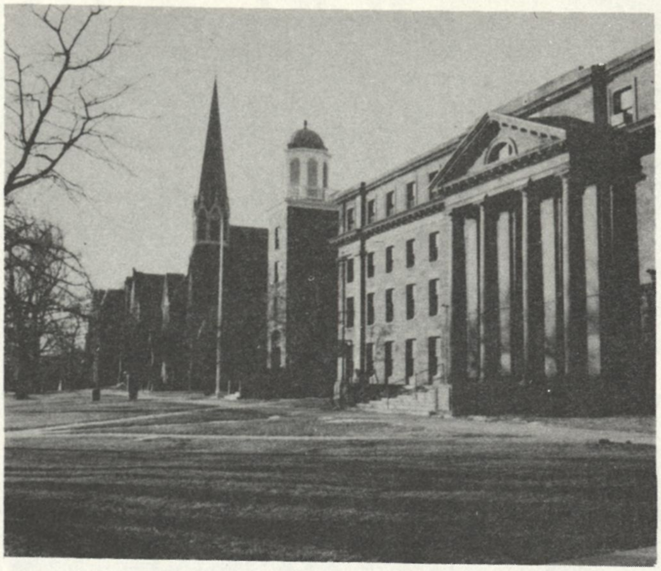
Early Mining

In Connecticut, quarrying for nature's earth materials began with prehistoric Indians, who mined quartz for tools and soapstone for bowls. Evidence of early mining was uncovered by archaeologists in soapstone quarries like the Ragged Mountain shelter-quarry in what is now Peoples State Forest. Another probable site of Indian mining activity is at Soapstone Mountain, near Somers. This same quarry was later used by Colonial Americans.

Brownstone quarries were opened in the Central Valley by the early Colonists. This dimension stone, mined from about 1640 to 1938, was widely used in the late 1800s. Several large quarry sites can still be seen in Portland where much brownstone mining took place.

Iron and Copper

Some of the earliest Colonial mining in Connecticut was for iron ore. Iron has been mined from several mineral forms in the state: magnetite and hematite (both oxides of iron), limonite-goethite (hydrates and oxides of iron), siderite (a

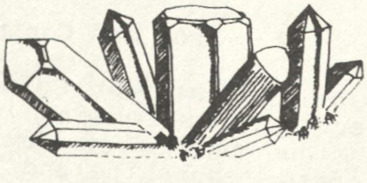


Wesleyan's "college row" is constructed with brownstone mined from Portland quarries.

carbonate of iron), and some iron pyrites (iron sulphide -- the most common of which is pyrite, or "fools' gold"). A naturally occuring iron-rich sludge, "bog iron" ore, has also been mined here.

After iron, copper was Connecticut's second most important metal. Copper has been obtained from the following mineral forms: chalcocite (a copper sulphide), bornite (copper iron sulphide), native copper (pure copper), cuprite (copper oxide), chalcopyrite (copper iron sulphide), and malachite (copper carbonate hydroxide). The two most important mines have been the Newgate Copper Mine -- and prison -- and the more successful Bristol Copper Mine. Both mines were operating in the 1700s and 1800s.

Today, our most valuable mineral commodities are "trap" and sand and gravel.



Other Metals

Smaller amounts of other metals and minerals have been mined or sought after. Cobalt, for example, was mined in the section of East Hampton now known as Cobalt, and used in the coloring of ceramics. Barite was mined near Cheshire for use as a pigment in paints. Tungsten was mined at the old Trumbull Tungsten Mine for use in steel alloys. Lead was mined at the old Middletown Lead and Silver Mine around the time of the American Revolution, and -- at various times -- in Wilton and Monroe. Small amounts of silver were mined from veins now covered by the Maltby Lakes near New Haven. Silver is also found as a by-product of most lead mines.

According to still unverified reports, Governor Winthrop "roasted gold ores, assayed metals, and cast gold rings near Great Hill in the town of Cobalt." This area continues to be known as the "Governor's Ring." Exciting news of the presence of gold at the Governor's Ring came this past summer when geologists from the University of Connecticut found tiny gold flecks in quartz samples. Is it possible that a significant deposit exists? Overall, Connecticut's record of metal mining consists of little more than a series of disappointments.

Nonmetal Mining

A limited amount of garnet mining, primarily for use as an abrasive, took place in both the western and eastern highlands.

Mining for feldspar and mica from granitic pegmatites began in the early 1800s, and continues to the present. One of the earliest pegmatite quarries, the White Rocks quarry along the Connecticut River in Middletown, is still active. Although pegmatites were mined in many areas of the eastern and western highlands, the Middletown Pegmatite District was the focus of commercial feldspar and mica mining.

The Middletown Pegmatite District is unusual in that many of its pegmatites are enriched by rare metals, producing minerals of purple, red, blue, green, and yellow. Some of these minerals are fluorescent under ultraviolet light, and a few are radioactive. Gem minerals, such as aquamarine, morganite, and heliodor (varieties of the mineral beryl -- related to emerald), elbaite (a variety of tourmaline), spessartine garnet, fluorite, and others, have been found. The occurrence of these gems still lures rockhounds to the hills and old quarries of the highlands east of Middletown. Tiffany's jewelry store of New York City once operated a gem mine in one of the pegmatites near Haddam Neck. Pegmatite mining continues within the district today.

Mining Today

Today Connecticut's most valuable mineral commodities are crushed stone (predominantly basalt, commonly called traprock, or "trap") and sand and gravel.

Traprock is an ideal crushed stone aggregate for roadbeds, with precast concrete, and for general construction. Traprock typically does not powder or fracture easily and is resistant to chemical alteration, as opposed to brownstone or marble. Brownstone, for example, will break down into its component sediments as a result of acid rain, as well as by cyclic freezing and thawing.

Sand and gravel deposits are the second major source of aggregate for Connecticut's construction industry. These consist of fragments of rocks and minerals deposited by the melting glacier at the end of the last ice age, about 14,000 years ago. Sand and gravel deposits typically occur in major river valleys where they were formed as deltas of glacial lakes.

Pegmatites are still mined from open pit quarries in the old Middletown Pegmatite District in Portland and Middletown for the production of feldspar. Mica and quartz are by-products of feldspar production.

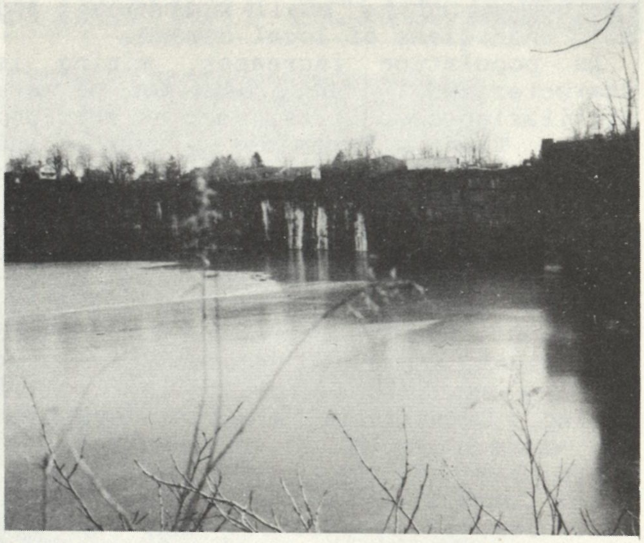
Marble is quarried for agricultural lime and other crushed stone products. Marble is found in western Connecticut in a north-south trending region known as the Marble Belt.

The Ottawa Silica Company of Ottawa, Illinois, mines quartz and operates a plant at Lantern Hill near the site of the old Silex Mine in North Stonington. The relatively pure quartz (silica) mass is mined for silica for the glass industry and for high-quality sand blasting material.

Ancient glacial lake clay deposits and some selected fine-grained shales are mined in the Central Valley for the manufacture of bricks.

Dimension granite is produced at three quarries in the state. It was primarily marketed as rough blocks and cut stone. Quartzite (a metamorphosed sandstone) was also produced as a dimension stone. Interestingly, this quartzite is the same geologic unit as the quartz veins in which gold was reported near Cobalt.

Many individual collectors and mineral clubs in the state have recovered mineral specimens and gemstones from quarries and mine dumps. High quality specimens can be found but, unfortunately, access to collecting sites is often difficult.

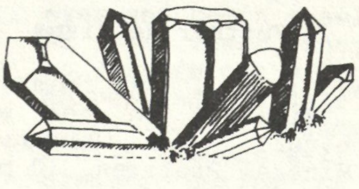


Today the Portland brownstone quarries are water-filled.

The Three Phases of Mining

In western industrialized countries, economic geologists recognize a three-phase progression of mining. In the first phase, which in Connecticut ended around the time of the Civil War, materials mined and produced are those with high unit values -- precious metals, gemstones, copper, lead, and cobalt. Such materials can be easily trans-

Mining will continue to be an important part of our state's economy



ported, mined by small operators, and sold regardless of local demand.

As population increases, mining is characterized by the production of more utilitarian comodities, such as iron and lime. This is considered the second phase. During the first phase, Connecticut was a mineral exporter. From then on, it has been an importer. This second phase continued until 1923. The ensuing third phase has been characterized by the mining of materials used for building, such as crushed stone, sand and gravel, and clay. Transportation is the key economic factor in third-phase mining. Connecticut, like most areas in the western world, is characterized by third-phase mining.

As Connecticut's rapid development continues, it is possible that valuable mineral resources -- primarily sand and gravel which are typically located in valleys -- will become unminable. Areas of sand and gravel make excellent building sites, and the development of such areas may prevent mining. Depleting the availability of construction aggregrate means simply that the material will have to be trucked in from farther away. This then increases cost, and overall economic development slows down. One alternative here could be to hold land in reserve for future mining. This would require coordinated action by local and state governments, as well as by land owners. Valuable deposits would have to be identified, evaluated (e.g., in terms of future transportation requirements), and then purchased.

Mining and Connecticut's Environment

Phase-three mining activity in Connecticut has been a benefit to the construction industry, in that quality earth materials are within reasonable distances, and has been a great value to the state's economy -- $84.7 million in 1985. Further, it may be a surprise to many that Connecticut is among the top ten states in the country in value of mineral production per square mile (number seven in 1983). Mining has been an important part of Connecticut's past, and will be an important part of its future. An understanding of this industry, its benefits and impact, is necessary for anyone concerned with our state's environment.

Activity at a sand and gravel pit in South Windham.

Further Readings

Bonin, William A., and Thomas, Hugo F., 1978, "Minerals in the economy of Connecticut": U.S. Bureau of Mines State Mineral Profiles, 10 pages.

Harte, Charles R., 1944, "Connecticut's iron and copper": Connecticut Society of Civil Engineers, 60th Annual Report, pages 131-165

Harte, Charles R., 1945, "Connecticut's minor metals and minerals": Connecticut Society of Civil Engineers, 61st Annual Report, pages 137-184.

Prosser, L.J., and Altamura, R.J., 1985, "The mineral industry of Connecticut in 1984": U.S. Bureau of Mines Minerals Yearbook.

Skinner, Brian J., 1980, "The mineral wealth of Connecticut -- present, past and future": Discovery, volume 15, Number 1, pages 26-31. ■

DEP Wildlife Information Series

Skunks are usually mild-tempered by nature, and will not defend themselves by spraying unless provoked. The skunk pictured here has been provoked. (Photos: Leonard Lee Rue III)

Here, kitty-kitty-kitty...

The eastern striped skunk (Mephitis mephitis) is one of the more common mammals of Connecticut. It weighs between six and 14 pounds and is about the size of a house cat. Its body is covered with fluffy black fur with a narrow white stripe at the middle of the forehead. A broad white area on the top of the head and neck usually divides into two strips along the back. The long, bushy tail is a mixture of white and black hairs. The skunk has a small head, small eyes, a pointed snout, and short legs which make the animal appear to "waddle" when it walks. Sharp teeth and long claws enable the animal to dig or pull apart rotten logs in search of food.

The skunk is a member of the mustelid family which includes the weasel, mink, marten, fisher, and otter. All mustelids produce a strong-smelling liquid from anal scent glands, but only the skunk can spray this scent as a defense mechanism. In fact, the skunk's scientific name, Mehpitis mephitis, translates appropriately into "bad odor."

Biology

Mating takes place during late February and early March. An average of six blind and helpless young are born in mid-May. At three weeks of age, the young skunks open their eyes and begin crawling. At seven weeks, they begin to venture out with their mother and are able to spray musk if necessary. Family members will usually disperse during the fall of

Sharp teeth and long claws enable the skunk to dig or pull apart rotten logs in search of food.

their first year. Adult males are usually solitary except during the mating season.

Skunks are primarily nocturnal, although it is not unusual to see them during the day. They usually spend the daylight hours sleeping in their underground burrows. Burrows can be found along field borders, under stone walls, or under buildings. They will also readily use the abandoned dens of other animals. Usually only one burrow system is used for both shelter and raising the young. Burrows are also used during periods of winter dormancy. Adult male skunks normally rest alone and may become active during mild weather. Females and young may rest together as a group to increase warmth during the winter.

Skunks will eat a wide variety of food. Insects, fruits, small mammals, reptiles, amphibians, birds, eggs, and carrion are all readily eaten. Their varied diet increases chances for survival and enables them to adapt to changing environments.

Protection

The skunk is probably best-known for its protective musky spray. The scent glands that provide this unique method of defense are deeply embedded in muscles located on either side of the rectum. These glands secrete a sticky, yellow fluid, the main component of which is butyl mercaptan. The skunk is a good marksman, and can spray accurately up to 10 feet or more. Skunks are mild-tempered by nature, and will not defend themselves by spryaing unless provoked. Skunks will usually stamp the front feet and arch the tail up over the back as a warning before spraying. If confronted by a skunk in this position, it is best to make a slow, quiet retreat.

The spray is normally directed toward the eyes and may cause temporary blindness and nausea. Rinsing the eyes with water will help to regain vision. Tomato juice or diluted solutions of vinegar may eliminate most of the odor from people, pets, and clothing. Clothing can also be soaked in weak solutions of chloride bleach or ammonia

Benefits

Skunks have a voracious appetite for insects. About 70 percent of their diet consists of insects which are considered harmful to humans. Also, many mice, voles, shrews, and moles are eaten on a regular basis which helps to keep the rodent populations in check. The number of eggs and birds eaten by skunks is normally minimal due to the abundance of preferred foods.

Managment of Nuisances

Skunks will dig up lawns and gardens searching for insect larvae and grubs. Large portions of a yard can be damaged in a single night. This problem can be partially solved by having an insecticide sprayed on the lawn to kill grubs. This will eliminate the skunks' food source and help control many lawn insect pests.

Garbage cans should have tight-fitting lids and should be kept out of reach of any wild animal. Rubber straps with metal hooks on both ends, called "jump cords" or "bungy cords," (available at all hardware stores), can be used to secure a garbage can. This is one of the most successful methods.

Skunks which have taken up residence under the porch or house can be taken care of by fencing around all foundation openings. Seal up all openings except one until the animal has left to feed. Flour can be sprinkled on the ground near the opening and checked periodically for foot prints leading out. Sealing burrows from early May to mid-August may leave young skunks trapped inside. Be sure all animals are out before sealing the final opening. Skunks are good diggers so any fencing may have to be buried at least one foot deep. Fencing will also help keep skunks out of the garden since they are not good climbers.

If a skunk happens to find its way into the basement or garage, just leave a door open and let the animal come out on its own. In the future, try not to leave an access open to these places since almost any wild animal with a curious nature may wander in.

As mentioned before, skunks are not good climbers and often become trapped in window-wells. A flat, wide board placed at a low angle will usually allow the animal to get out on its own.

Skunks can be live-trapped and released at least five miles away in suitable habitat. Traps should be covered (all except the entrance) with something like burlap to help keep the animal calm and prevent anyone from being sprayed. Traps are baited with chicken parts, cat food, or peanut butter. Captured animals should be released as soon as possible. Live-trapping is only a temporary control measure, since other individuals may soon move back into the area.

References and Further Readings

W.H. Burt and R.P. Grossenheider, A Field Guide to the Mammals. Houghton Mifflin Co., Boston, 1976.

A.J. Godin, Wild Mammals of New England. The Johns Hopkins University Press, Baltimore, 1977.

J. Harding, An Animal Damage Identification Guide for Massachusetts. Univ. of Mass. Coop. Ext. Serv. Booklet, 1980.

Skunks. Univ. of New Hampshire Coop. Ext. Serv. Booklet. Wildlife Fact Sheet No. 5, 1981.

The Technical Assistance Information Series is 75 percent funded by Federal Aid to Wildlife Restoration -- the Pittman-Robertson (P-R) Program. The P-R Program provides funding through an excise tax on the sale of sporting firearms, ammunition, and archery equipment. The remaining 25 percent of the funding is matched by the Connecticut Wildlife Bureau. ■

About 70 percent of the skunk's diet consists of insects which are harmful to humans.

Speaking Up for Threatened and Endangered Species

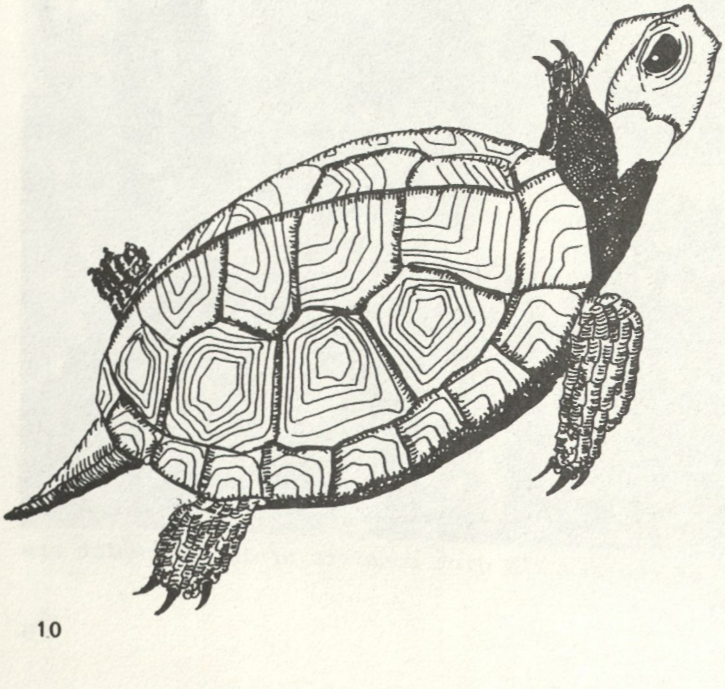
by Joey Corcoran,
Assistant Director for Environmental Affairs,
Connecticut Audubon Society

Remember the excitement and delight you felt when you watched a hawk soar high overhead, glide majestically, then drop suddenly to maneuver through a forest? What you saw might have been a sharp-shinned hawk. Have you ever walked through a bog in northwestern Connecticut, heard a soft splash, and looked just in time to glimpse a turtle shell disappear underwater? That might have been the elusive and rare bog turtle. The future of these creatures and many others will be greatly affected by the coming legislative session.

The sharp-shinned hawk and the bog turtle are two of many Connecticut wildlife species which are currently threatened by loss of habitat, or by human disturbance during critical nesting periods. The Wildlife Bureau of the DEP is charged with the conservation and management of all forms of wildlife in the state. Resources, however, have been insufficient to fulfill that mandate.

The "Nongame" Species

Traditionally, support for wildlife management has come from the sale of hunting and fishing licenses and from taxation of sportsmen's equipment. As a result, management efforts have been concentrated on game species. Wildlife species which are not hunted or trapped outnumber game species 10 to one. Present funding, however, has allowed for the management of only a very limited number of "nongame" species. The efforts to restore osprey and bluebird populations, for example, have been very successful, but other wildife species continue to need attention.



In 1981, the Connecticut Audubon Society and the DEP initiated a joint effort to broaden the scope of existing wildife programs. The Connecticut Wildlife Conservation Committee, composed of 11 prominent wildlife specialists, was convened to research existing programs throughout the nation, and to come up with an appropriate proposal for Connecticut. The committee reviewed the wildlife programs of 42 other states, and determined that a wide-reaching, comprehensive approach was preferable to a program focused primarily on endangered species. Accordingly, the committee drew up an 11-point proposal which emphasizes management and protection of **ecosystems** as the means o maintaining all wildlife, although special attention is given to threatened and endangered species.

Elements of Wildlife Management

The main elements of wildlife management programs are resource inventory, habitat management, wildlife education, and wildlife recreation. At present, there are many "unknowns" regarding those wildlife species which are not hunted or trapped. A first step toward their management, therefore, would be to establish baseline data on their abundance, distribution, and habitat requirements. A second step would entail identification of natural areas which are critical wildlife habitat, with suggestions for ways by which they may be conserved. Part of this task could be undertaken in cooperation with the state's Natural Diversity Data Base, which already contains listings and locations of threatened and endangered species. Finally, building on current management efforts initiated by non-profit groups and conservationists, appropriate management schemes could be developed.

Citizen Awareness

The success of preserving the natural diversity within Connecticut's ecosystems ultimately rests on citizen awareness. Therefore, an increase of educational and recreational opportunities involving wildlife is another vital component of the program. Current environmental education programs offered by the state and by conservation groups, while excellent, reach only a limited number of the state's residents. The proposed wildlife program provides for considerable expansion of existing programs and makes a concentrated effort to reach a broader spectrum of the public. In both the educational and recreational facets of the program, opportunities for direct contact with wildlife will be developed. The state of Missouri, for example, has been particularly successful in offering interpretive events -- such as "Eagle Days" -- which provide the public with the chance to directly observe and learn about the wildlife their tax dollars help to protect.

The comprehensive wildlife management program, as conceived by the Wildlife Conservation Committee, is now ready for legislative action. The key to its successful institution is funding and public support. A recent survey of Connecticut residents was completed by the committee, indicating that there is strong public support for an expanded wildlife management program -- even if it costs more money. The task at hand is to translate that public support into votes in the legislature.

The effectiveness of wildlife management programs in other states has been dependent on predictable sources of revenue. In view of this, the Wildlife Conservation Committee is suggesting to legislators that a portion of the state's existing revenue stream be set aside expressly for the wildlife management program. Dedicated funds have not been popular with the Connecticut legislature in the past. Sufficient vocal support, however, from concerned citizens regarding (1) the value of a wildlife management program that addresses "nongame" as well as game species, and (2) the need for a reliable source of funding to implement it could persuade legislators.

A Call for Help

The Connecticut Wildlife Conservation Committee is asking for help this session to inform legislators about the importance of this proposal. Remember your own unique experiences with wildlife here in Connecticut. There is an opportunity right now for all of us to help in the preservation of sharp-shinned hawks, bog turtles, and many other wild creatures in Connecticut.

For more information regarding this proposal and other legislative actions, please send your specific request and name to Connecticut Audubon Environmental Center, 118 Oak Street, Hartford, CT 06106. ■

Sharp-shinned hawk. (Photo: L. L. Rue III)

An arboretum is a living museum of woody plants that are hardy in, but not necessarily native to, the local climate, according to Ted Lockwood, director of the Bartlett Arboretum. Arboreta (the plural form) prominently feature trees in their collections, as well as some woody shrubs and vines. Arboretum displays are primarily outdoors and accessible throughout the year.

The Bartlett Arboretum in Stamford is part of the Depa of the University of Connecticut.

Stamford's Bartlett Arboretum

A place for study, research, and a quiet walk u

Text and photos by Martha Kelly

The Bartlett Arboretum, located in Stamford, is part of the Department of Plant Science of the University of Connecticut, but its name reflects the property's earlier history. It was once the residence and research facility of Dr. Francis A. Bartlett, an eminent dendrologist and businessman. Many of the specimens now featured in the arboretum were planted during Dr. Bartlett's lifetime; he collected tree species from around the world.

After Dr. Bartlett's death, the property was offered for sale, and in 1965, it was purchased by the state of Connecticut.

Today the Arboretum is part of the Department of Plant Science of the College of Agriculture and Natural Resources at UConn. It serves both the university and the public as an educational facility. Nature lovers and walkers will find hours of enjoyment in its gardens and woodland trails. The property adjoins the Stamford campus of UConn and the city-operated Stamford Museum and Nature Center, creating an extensive system of trails through the combined territories.

The Arboretum's library of 2000 volumes, exclusive of journals, is Connecticut's largest horticultural library. Plans are under way to renovate the library and enlarge the collection. Director Lockwood indicates that donations to the Arboretum's library endowment are welcomed. The library is open to the public during the administration building's hours: 8:30-4:30, Monday through Friday.

The Arboretum is designed to assist home landscapers, making it possible to observe the growth of uncommon species. The staff are ready to provide guidance

rtment of Plant Science

The Arboretum contains a wide variety of tree species, as well as bulb and flower displays.

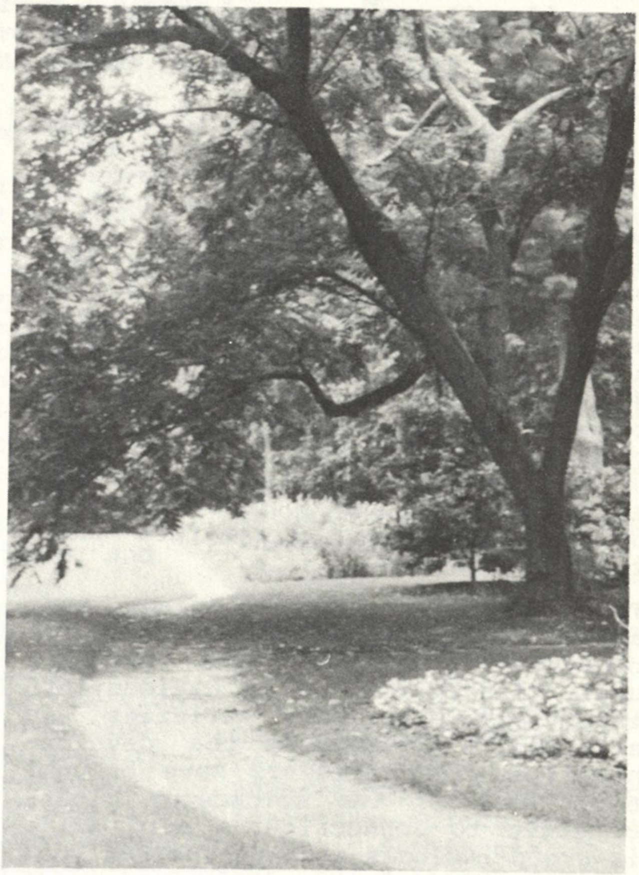
nder the trees

on species selection; they also regularly examine plant material for visitors, diagnosing disease or pest problems of ornamental plants.

Educational Programs

The Arboretum serves the university as an outdoor classroom, providing student internships, research opportunities, and more conventional classroom facilities.

The lectures and workshops offered by the Arboretum afford the public a rare opportunity to obtain professional instruction in horticulture. Courses are taught by university faculty or other noted naturalists. The programs vary from informal lectures and walks, to more comprehensive programs on tree identification, culture, and ecology. Several trips to other sites are planned each year; the 1985 summer season fea-



The availability of self-guided walking tours greatly enhances the facility's accessibility.

tured a weekend trip to explore the wildflowers of Cape Cod.

Although the Arboretum's displays are of greatest interest to adults, Ted Lockwood is also interested in reaching the younger audience. Recognizing that today's children are the decision-makers of tomorrow, he is "concerned that children understand the importance of plant material to human life." The Arboretum offers two six-week guiding programs annually, in the spring and fall, during which volunteer guides enliven the visits of elementary-school groups.

Research on both new and standard plant varieties is conducted at the Arboretum. Extensive records are kept on all the plant collections, as a part of Bartlett's ongoing research. Ted Lockwood says of the individual plants: "We treat them all as patients."

The Arboretum's Collections

The Bartlett Arboretum property is a compact 63 acres, half of which may be cultivated, with the other half retained as natural areas. In order to make the best use of this space and to supplement the displays of Connecticut's other two arboreta, the Bartlett has chosen to specialize in two plant groups: slow-growing (dwarf) conifers, and ericaceous (acid-loving) plants. Each of these groups has relatively modest space requirements.

These special collections are of particular interest to the home landscaper. The conifers offer a remarkable variety of growth habits, from upright geometric shapes to weeping or even prostrate varieties of the same species. The slower-growing forms are of great value to the homeowner for their ease of maintenance and contribution to the longevity of a landscape design.

Bartlett's conifer collection is the second-largest on the East Coast, featuring nearly 300 types. It includes many species native to Asia as well as the "witches'-brooms" collection, a group of new ornamental conifers under development by UConn.

The ericaceous plants include many standard landscape plants, including the rhododenrons, azaleas, and mountain laurel. The collection is divided into natural and cultivated varieties, so that visitors may observe the developments that plant breeders have brought about. Many of the ericaceous plants are native to Connecticut's acid soil; this group includes such unexpected species as wintergreen, exydendron, and Indian pipe.

The Arboretum also contains a wide variety of tree species, plus bulb and prennial flower displays. A series of self-guiding walks are under development with two already completed. Annual additions to the self-guiding tours are planned.

The Arboretum is open daily from 8:30 a.m. until sunset. Since many visitors come in the evening hours, when the administration building is closed, the availability of self-guided tours greatly enhances the facility's accessibility. The "Guide to 101 Woody Plants" is available in the Arboretum's outdoor information center and provides a fine starting point for exploration.

The walking tour includes such unusual species as the dawn redwood, a deciduous evergreen thought to be extinct until its rediscovery in China in the 1940s by an American expedition. Among the highlights of the tree collection are cut leaf and copper beeches, the exotic dogwoods, and such Asian ornamentals as the Korean stewartia.

The Bartlett Arboretum Association

The Arboretum is actively supported by a private non-profit group, the Bartlett Arboretum Association. This group provides volunteer support which supplements the Arboretum's staff of three. Some 100 volunteers maintain the greenhouse, greet visitors, offer guide service, raise funds, edit the quarterly newsletter, and provide other essential services.

Membership dues and donations provide important financial support, including funds for greenhouse supplies and for the purchase of additions to collections. Members receive a quarterly newsletter with articles on horticultural subjects by UConn faculty and news of Arboretum activities. Members also enjoy reduced rates for educational courses. The 1985 calendar included such programs as "Landscape Renewal," "Pruning Demonstration," "Natural Dyes Workshop," and "An Introduction to the Art of Bonsai."

To Visit the Arboretum

The Bartlett Arboretum, 151 Brookdale Road, Stamford, is located just one and one-half miles from Exit 35 off the Merritt Parkway. Its grounds are open daily from 8:30 a.m. to sunset and the administration building is accessible from 8:30 a.m. to 4:00 p.m., Monda through Friday. There is no charge fo admission. Group tours may be arranged. For further information on membership or programs, phone 322-6971.■

For Your Information

A Warning about Space Heaters

by Leslie Lewis, Citizens' Participation Coordinator

The U.S. EPA has recently issued a chemical advisory regarding the burning of used oil in space heaters. Advisories are released periodically as EPA determines which commonly-used chemicals may present a risk to man and the environment.

The EPA is currently revising its regulation of used oil as a fuel. This will have an impact on those who have previously collected and burned waste oil. The following is a summary of the EPA's "Notice of Potential Risk," which points out the possible dangers of this practice and makes recommendations for insuring the safe operation of space heaters.

* * *

Basis for Concern

In some workplaces, especially garages, service stations, etc., used oil is burned in space heaters. Used oil, especially oil from gasoline-powered engines, contains lead that has been deposited as a by-product of fuel combustion in the engine. When this oil is burned, lead is present in the exhaust gases. If these gases are not vented to the outside, workplace air can become seriously contaminated with lead.

Excessive levels of lead in inhaled air can cause toxic effects in humans, including irreversible brain and nerve damage, kidney failure, anemia, high blood pressure, various blood and metabolic disorders, and gastrointestinal disturbances.

Lead particles may also be deposited on workplace surfaces if exhaust gases are not vented. These particles can be ingested inadvertently, increasing the exposure to lead.

In addition to lead, waste oil usually contains other toxic materials or chemicals that are not completely destroyed or removed during combustion. For instance, high levels of arsenic, cadmium, chromium, barium, polynuclear aromatic hydrocarbons, and various solvents were found in some waste oil samples that were analyzed by EPA. The emissions of some of these chemicals (e.g., arsenic and chromium) from a single space heater are associated with significant cancer risk.

Background

There are two types of space heaters that are designed to burn waste oil: vaporizing and atomizing burners. Vaporizing burners operate by heating a film of oil below the combustion zone to cause vaporization of the oil, which is then burned. Atomizing burners use low-pressure air to create an atomized mist of oil in the combustion zone, and the mist is burned.

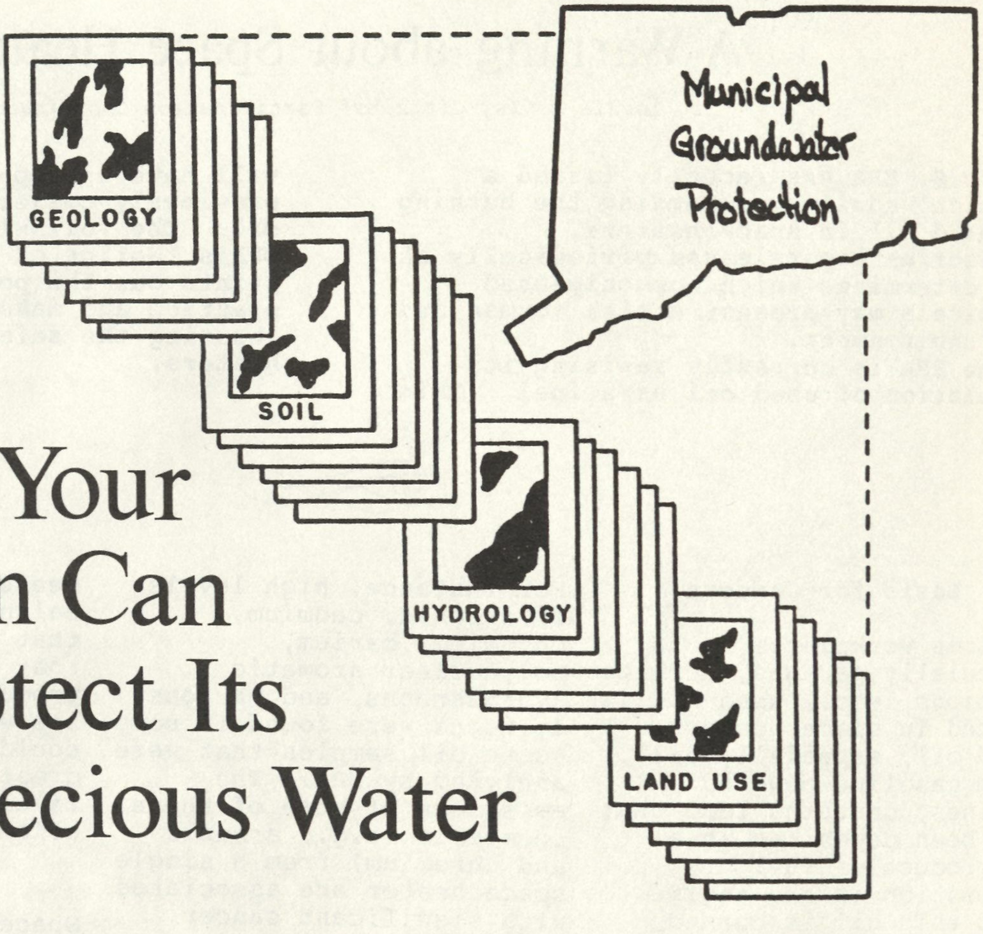
EPA conducted test burns in both types of space heaters with used oil. Levels of lead in the flue gases were measured, and these levels were used to calculate the probable levels of lead in the workplace air under typical ventilation conditions.

Based on these measurements and calculations, EPA estimates that unvented space heaters that burn used oil may produce levels of lead in the workplace air that could be six to 1400 times greater than the lead levels know to cause toxic effects in adults.

Recommendation

Space heaters that burn used oil should be installed so that the exhaust gases are vented to the outside, in order to prevent build-up of toxic levels of lead in the air. Care should be taken so that the vented exhaust gases do not cause unnecessary exposure to people outside the heated workplace; the vent should exhaust the gases above roof level where feasible, avoiding passers-by or intake by other buildings. The owner should contact the space heater supplier for help in proper installation, venting, and maintenace of the unit.

For a copy of the information supplement to this chemical advisiory, call toll-free: 800-424-9065, or write TSCA Assistance Office, Office of Toxic Substances, U.S. EPA, 401 M Street, SW, Washington, DC 20460. ■



How Your Town Can Protect Its Precious Water

A municipal planning process for groundwater protection

by Jim Murphy
Principal Environmental Analyst,
Water Compliance Unit

(This is the second of two articles.)

A Planning Process for Groundwater Protection

The January issue of the Citizens' Bulletin presented an article on the DEP's philosophy and recommendations for municipal involvement in groundwater protection. Included in that article was a general outline of the areas such recommendations would address, the statutory basis for protection efforts, and the need for the direct participation of local boards and commissions. Also noted was the DEP's publication, "A Planning Process," which is intended to serve as a guideline for municipal efforts toward groundwater protection. The following article will present more detail on the recommended process.

The planning process consists of four phases. The total process is incremental, in that each phase is designed to bring local groundwater committees to key decision points. The end result [illegible] the process is two-fold: first, the achievement of a broad understanding of the issues involved in groundwater protection; and second, adoption of speci-

Table I
Groundwater Protection Planning Process

Phase I **DATA COLLECTION & DISPLAY**
Where are you right now?

A. Natural features
- Base Map 1. Hydrologic system -- drainage basins, wetlands, flood plains
- Overlay Map 2. Groundwater resources -- bedrock-till system, stratified drift system
- Overlay Map 3. Reserved/Conserved lands and waters -- natural areas, parks, prime farmland, fisheries

B. Water Quality/Quantity and Distribution systems
- Overlay Map 4. Existing water supply sources and service areas -- public wells, water supply reservoirs, private well areas
- Overlay Map 5. Waste disposal sites and service areas -- landfills, sewage and industrial discharges, sewer service areas
- Overlay Map 6. Water Quality Classifications -- state-designated surface and groundwater quality conditions and goals

C. **Land Use/Types/Distribution**
- **Overlay Map 7. Land use character by its risk to groundwaters -- residential, commercial, industrial, agriculture, open space**
- **Overlay Map 8. Zoning -- town zone district boundaries**
- **Overlay Map 9. Plan of Development -- town proposed land uses, Locational Guide Map of the state's Conservation and Development Policies Plan**

D. **Data**
- **Statistical/Reports/Maps -- what other data is available for your town?**
- **Existing regulations/Staff -- existing zoning, subdivision regulations, ordinances/who is on staff and what do they do?**

Phase II **EVALUATION**
Where are you going?

A. **Present groundwater quality, quantity and use**
1. **Contaminated groundwater and use -- where is it, who is using it?**
2. **Uncontaminated groundwater and use -- where it is, who is using it?**
3. **Groundwater resource and use -- most significant supplies now available and how they are being used.**

B. Future groundwater quality, quantity and use

4. Future sources -- where are they?
5. Future sources and planned growth -- are they near growth areas and are they adequate?
6. Future sources and infrastructure -- will sewer and water lines serve growth and future source areas?

Phase III **PROTECTION GOALS**
Where do you want to go?

1. Throughout municipality -- are new ordinances, rezoning, or revised plans needed?
2. Contaminated areas -- can they be restored or should water be piped in?
3. Uncontaminated areas -- how to keep them that way?

Phase IV **IMPLEMENTATION/ENFORCEMENT MECHANISMS**

How can you get where you want to go?

A. Federal and state government programs -- what can they do to help
B. Municipal role -- basically, land use management
C. Management tools -- 1. Regulatory through zoning, ordinances; 2. Non-regulatory -- incentives, education, assistance
D. Studies -- monitoring, further detailed data collection, etc.

fic and appropriate management policies and action.

The planning process, from start to finish, is outlined in the table above. Each phase is designed to respond to certain very specific questions in regard to municipal groundwater protection. These questions are: (1) Where are you right now? (2) Where are you going? (3) Where do you want to go? and (4) How will you get there? In expressing the process in this manner, it is possible to assess progress, at any point, in clear and measureable terms.

Phase I: Where Are You Right Now?

In Phase I, several simple overlay maps will be made and readily available information will be collected. This data will describe where a town is today and where it appears to be going in regard to land and water use. This first phase is very important. It will serve as the information base for the next three phases. It will also constitute a library for use by all local commissions. The department will aid towns in collecting the data and in its preparation of maps. Though a town may in fact have many of these maps on hand, they may be either out of date, of differing scales, or not in transparent overlay form.

Phase II: Where Are You Going?

In Phase II, the information collected in Phase I will be assessed. Basically, a town will ask itself where it is today in respect to groundwater quality and quantity, what trends exist, and what conditions can be expected in the future. In this phase, it will become clear if significant groundwater resources are present, if groundwater quality is suitable for its present and proposed use, and if water supplies have been effectively considered in projected growth plans.

Phase III: Where Do You Want To Go?

In Phase III, a town is asked to determine if its projected land use and water supply environment are desireable and appropriate. While in Phase II future conditions are projected, the question to be answered in Phase III is are those conditions are desireable and, if not, what conditions are desireable.

If provision of clean water in the quantities needed for existing and future demands is largely determined by local government, then that municipality must decide if perceived trends can be allowed to continue. This phase represents the most crucial decision point for a town.

Phase IV: How Can You Get Where You Want to Go?

Once the decision is made in regard to a town's water supply future, then it is a straightforward matter to select the appropriate land and water use management tools. This is the objective of Phase IV.

Table 2. lists a number of actions that are used by towns to control land and water use. These constitute the essence of Phase IV, alternatives on how to get where you want to go.

As indicated, the alternatives are grouped into two distinct types, the Regulatory and Non-regulatory. Regulatory actions appear in two forms: first, there are those which involve boundaries, such as zones, districts, soil types, etc. Here, land uses are either permitted or excluded based on their harmony with the area in question, or based on the value of that site for some other use. In the other regulatory form, controls are placed on specific land or water activities wherever they occur in a town.

Non-regulatory actions are those used to achieve some desirable end, not through issuance or denial of permits, but through such incentives and aid as tax relief, technical assistance, education, or other management practices.

Certainly, few towns, if any, employ all of these measures, and it is unlikely that any municipality initially consider more than a half dozen of them. Most towns already have extensive zoning, subdivision, and wetland programs. Existing controls, therefore, may only need slight modification to be appropriate for groundwater protection. Similarly, existing education and conservation programs may only require some expansion.

If it becomes apparent many new controls are required, or major modifications to existing zoning regulations or a plan of development is necessary, it is recommended that the most pressing needs be addressed first. A municipality should not feel pressed to exercise many controls immediately and over every possible problem. Having methodically identified its groundwater protection needs, it should also methodically phase in the appropriate controls.

Table II
Municipal Action

1. REGULATORY -- Permits issued or denied
   A. Zones/District -- Regulate uses in such certain areas as: residential; commercial; industrial; agriculture; open space; flood plain; aquifer; watershed; coastal area; stream belt; wetland; soil type.
   B. Nonzoning -- Regulate certain uses anywhere: subdivisions; septic tanks; erosion and sedimentation; fuel storage; hazardous materials storage, use and disposal; sand and gravel mining; sewer avoidance; water diversions.
2. NON-REGULATORY -- Incentives, education provided
   Land acquisition; water conservation; tax relief on open space; conservation easements; transfer of development rights; farmland preservation; waste recycling; technical assistance; water quality monitoring; business inspections; household hazardous materials collection; use of voluntary best management practices; public education on all the above.

Assistance from the DEP

The DEP strongly recommends every municipality immediately begin to assess its groundwater protection needs. It is both in a town's best interest to do so, and it has now become a legislative mandate. The DEP recommends utilization of the "Planning Process," and DEP field personnel are ready to provide assistance in its use. Though completion of this process will take time and will involve discussion and debate, its is felt that the issue is suffiently serious and its potential impact is so great that it requires immediate and careful attention.

In future issues of the Citizens' Bulletin, articles will present further details on the planning process.

In the coming months, the Citizens' Bulletin will present further articles on groundwater protection.

The Bulletin Board

Versailles Pond Found Contaminated

Dr. Douglas S. Lloyd, Commissioner of the Department of Health Services (DOHS), and Stanley J. Pac, Commissioner of the DEP, have issued a joint statement concerning the consumption of fish taken from Versailles Pond in Sprague, Connecticut.

Dr. Lloyd recommends that women of child-bearing age, pregnant women, and children under six years of age should not consume any fish taken from Versailles Pond. All others should reduce consumption of fish taken from Versailles Pond to a maximum of one meal per month.

During 1984 and 1985, sediment and fish samples were collected from Versailles Pond by the DEP and analyzed for the presence of contaminants, including: cadmium, chromium, copper, lead, mercury, nickel, zinc, phenols, and polychlorinated biphenyls (PCBs).

Analysis of fish samples has shown mercury to be the primary contaminant of concern in some fish species. The levels of mercury found in pickerel and largemouth bass exceeded background or normal levels. Mercury is a heavy metal element which can cause damage to the nervous system of adults and of developing fetuses.

The DEP will identify sources contributing contaminants to Versailles Pond. Once identified, the contaminents will be subject to further study. These studies will include the evaluation of potential remedial measures. The DEP also intends to continue monitoring the quality of fish in Versailles Pond.

For further information, please contact Brian Toal of the Department of Health Services at 566-8167, or Brian Curtis of the DEP at 566-5903. ■

Upcoming Events at White Memorial

The following events are scheduled at White Memorial Foundation:

FEBRUARY

15 Saturday Nature Program -- Maple Sugaring Time, Jay Bacca, 2 p.m., Mott-Van Winkle classroom.

16 Sunday Nature Program -- Maple Sugaring Time, Jay Bacca, 2 p.m., Mott-Van Winkle classroom.

23 Sunday Nature Program -- Whales! Whales! Whales! Don Sineti, 2 p.m., Mott-Van Winkle classroom.

MARCH

1 Saturday Nature Program -- Hiking in Connecticut, Jay Bacca, 2 p.m., Mott-Van Winkle classroom.

2 Sunday Nature Program -- Bluebirds...Bring them back; film at 2 p.m., Mott-Van Winkle classroom, followed by bluebird house building workshop, Larry Mencuccini, Activity Shed. Kits -- $3.00 each.

8 Saturday Nature Program -- Canoe Tripping in the Maine Wilderness, Joan and John Benham, 2 p.m., Mott-Van Winkle classroom.

15 Saturday Nature Program -- The Rocks of Zion National Park, Ray Wilson, 2 p.m., Mott-Van Winkle classroom.

22 Saturday Nature Program -- Modified Hawaiian Crafts, Lucylle Young, 2 p.m., Mott-Van Winkle classroom.

The White Memorial Foundation is located on Route 202 in Litchfield. For further informaiton, phone 567-0857. ■

DEP Guest Lecturer

Looking for a guest speaker? The DEP's Information and Education Unit is offering a series of slide presentations by environmental educator Alberto Mimo. The presentations are directed to the adult level. The slide show and lecture last approximately one hour, with a question and answer period following. Some of the titles available are: the endangered species, understanding the tropical rain forest, the salt marshes, mammal skulls, the oysters of the Long Island Sound, the trap rocks of Connecticut, nuclear waste, and wild and edible mushrooms of New England. For more information call 566-8108 or write to Alberto Mimo, DEP Information and Education, Rm. 112, 165 Capitol Ave., Hartford, 06106. ■

Trailside Botanizer

The Shelf Fungi
In death and destruction, a delicate beauty

by Gale W. Carter

Illustrations by Caryn Alleva

Tinder conk

(Fomes fomentarius)

Shelf fungi -- foresters often refer to these curious growths as conks, others call them bracket fungi. Some of these unusual forms of fungi that attach themselves to trees are extraordinarily beautiful, but many are highly destructive to our forests. They all have spore-producing structures (the shelves) that project outward from logs, stumps, tree trunks, or occasionally from tree roots.

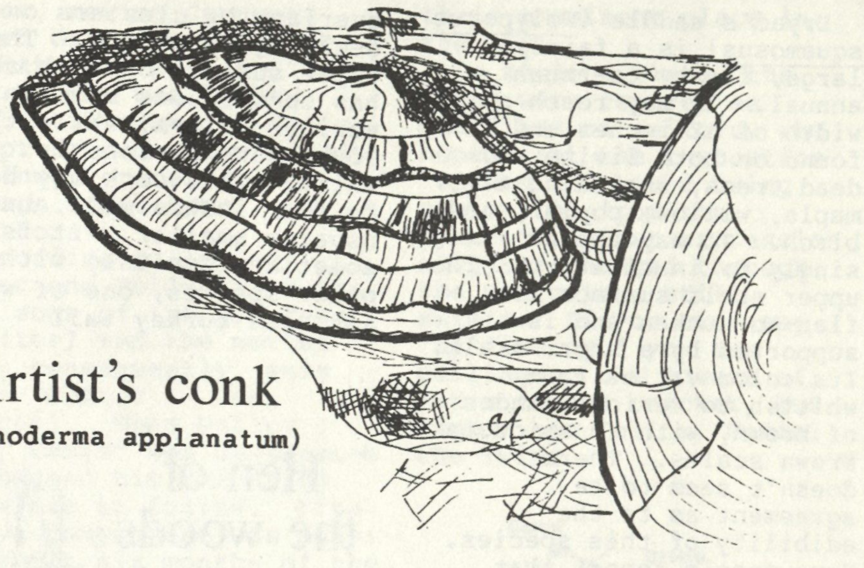
These fungi prey on both living and dead trees, depending on the individual species. Some will attack a living tree if it has a wound or break in the bark. Spores blown by the wind enter the tree through the break. The spores germinate a network of threads (mycelia) which secretes digestive enzymes which break down the wood. Eventually, when the fungus is well established, it will seek another break in the bark where it can produce a reproductive organ (the bracket). These brackets, or shelves, are often very woody, but in some species they are leathery, tough, or fleshy. Some are edible if picked when first developing.

The Polypores

Most of the shelf fungi discussed here are referred to as polypores, and are members of the family Polyporacea. A few belong to other genera within this same family. Polypores, or the genus Polyporus, means "many pores," referring to the many pores on the underside of the shelf. These pores lead into tubes where the spores develop. Some species have brackets that are perennial. This kind of fungus produces a new, wider layer of tubes each year. Those that produce annual brackets never have more than a single layer of pore tubes.

The winter months, when you can see the bare bones of a forest, is a good time to study shelf fungi, while a few are better observed during the summer. A common perennial woody shelf fungus, found in all seasons, is the tinder co[illegible] (Fomes fomentarius). It [illegible] a grayish-brown bracket that resembles a horse's hoof. This species attacks

© Gale W. Carter, 1986.



Artist's conk

(Ganoderma applanatum)

many kinds of dead deciduous trees and the wounds of living trees, particularly beech and birch. The shelf grows up to eight inches wide. It is called tinder conk because in Europe it was dried and used as punkwood, along with flint and steel, for starting fires. It was also used for cauterizing wounds.

The artist's conk (Ganoderma applanatum) is one of the most familiar of the shelves, and one of the largest. It is a perennial and sometimes grows up to 20 inches wide. This species is very destructive to valuable trees, attacking both living and dead trees. Deciduous trees, such as beech, maple, birch, and oak, are likely victims and there are reports of conifers also being attacked. The under-pore surface of this shelf fungus bruises easily, turning from white to brown. This characteristic makes it possible to draw on it with a sharp point. When the surface dries, the drawing remains permanently. Hence, the name artist's conk.

Closely related to the artist's conk is the varnished conk (Ganoderma tsugae). A beautiful, reddish-colored shelf, it often looks freshly varnished. It is softer and smaller than the artist's conk, growing up to 12 inches wide. It appears on dead conifers, particularly hemlock.

A conk similar in color and appearance that attacks only deciduous trees is Ling Chih (Ganoderma lucidum).

The birch conk (Polypoprus betulinus) is another familiar species, often appearing in large numbers on gray birch, both living and dead. It is an annual that grows up to 12 inches in width and persists through the winter. This shelf was once used as tinder and as a razor strop.

The cinnabar polypore (Polyporus cinnabarinus) stands out like a bright, reddish-orange beacon in the forest. It is tough and spongey, growing to a width of five inches. Not as common as some of the others, it is not considered a serious forest pest. It is usually found growing on dead wood of cherry, oak, and maple.

The sulfur shelf (Laetiporus sulphureus) is a fleshy annual that is both colorful and edible. It is often called "chicken of the woods," having both the taste and texture of chicken. These shelves appear either singly or in clusters. They vary in color from orange and red to orange-yellow, and have sulfur-colored pores. This conk grows up to 12 inches in width. There may be as many as 50 shelves on one tree. It commonly attacks both live and dead deciduous and coniferous trees. The shelves of this annual may appear in early summer, but are more often seen in late summer and fall. The fungus may appear on the same tree each year if conditions are right. The tender edges of the shelves are the part usually eaten -- they should never be eaten raw.

Not only is there a "chicken of the woods," but there is a "hen of the woods" (Polyporus frondosa), another fleshy annual that is a delicious edible. The common name comes from its supposed resemblance to the ruffled feathers of a hen. The growth habit for this species is a cluster of grayish-brown, spoon-shaped shelves, all arising from a common base. Each shelf may grow to about three inches in width. It is often found at the base of oaks, other hardwoods, and some coniferous trees. Clusters sometimes will weigh as much as 100 pounds, and will return to the same spot each year. The season for collecting is from September to November.

Dryad's saddle (Polyporus squamosus) is a fairly large, fleshy-to-touch annual. It may reach a width of 12 inches and is found on both living and dead trees, including elm, maple, willow, poplar, and birch. It may appear singly or in clusters. The upper shelf surface is flat-to-sunken and is supported by a short stalk. Its color varies from whitish to various shades of brown, with conspicuous brown scales. There doesn't seem to be agreement as to the edibility of this species. Some people report that young tips of the shelves are tastey if pickled, sauteed, or fried. Others feel that the species has little value as an edible.

The thick-maze oak polypore (Daedalea quercina) is a small, tough, grayish to yellow conk which grows to a width of six inches. The pores on its under-surface are round at first, but at maturity appear maze-like. This polypore attacks dead oaks.

Another conk that is very closely related is the thin-flat polypore (Daedalea confragosa). This species is about the same width, but the shelf has a thinner and sharper margin. It attacks a number of deciduous trees, both dead and alive, but usually not oak. The under-surface is also maze-like, and may sometimes bruise pink. Both species of Daedales were once used as currycombs to brush down horses that had tender skin. They were also used as tinder.

Turkey tails (Polyporus versicolor) are among the smallest of the shelf fungi. They are very thin and leathery, often appearing in numerous overlapping clusters on decaying hardwoods. The upper surface of each shelf has conspicuous bands of various colors, while the lower pore surface is white. This conk may be up to four inches wide, but is usually smaller. It is sometimes confused with two other species, one of which is false turkey tail (Stereum ostrea). This species is parchment-like in texture, and has a lower spore-producing surface which is light-brown and smooth. It is not a polypore. The true turkey tail has a white under-surface and is riddled with many fine pores, as you will readily see through a hand lens. The multicolor gill polypore (Lenzites betulina) is similar to the turkey tail, but has slit, or gill-like, pores on its under-surface which are visible with magnification.

Hen of the woods

(Polyporus frondosa)

The violet-toothed polypore (Polyporus pargamenus) appears in huge numbers on stumps and dead trees. It attacks at least 65 different tree hosts. This species is small, thin, and leathery, growing to a width of three inches. Its upper surface is yellow and brown, when young, and is hairy. As it ages, it becomes smooth and whitish. The pores on the under-surface are violet at first, and then become white and toothed.

Important Strands in the Web of Life

There is a great deal of beauty in the color and form of many of these conks. This may be a reason in itself for exploring them. More important, however, is their role in the forest ecosystem. They are nature's decomposers, reducing wood to soil agai and recycling nutrients. They also release carbon dioxide which green plants need for food-making. Shelf fungi are important strands in the web of lif and a knowledge of them will help us better understand how a forest functions. ■

The Night Sky

By Gemini

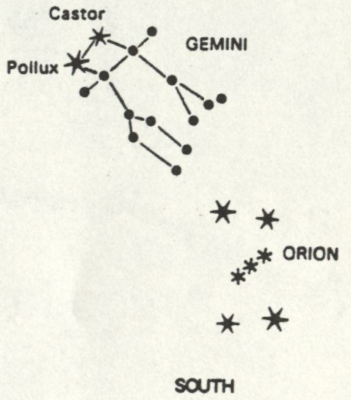
by Francine Jackson

With Halley's Comet out of sight this month, we can again consider the beauty of the winter sky. Looking due South, we observe the beautiful constellation Orion the Hunter. The familiar hourglass shape, once found, can never be forgotten. Three stars in a row, with two above and two below, form the pattern of the most famous hunter of all time.

It is said that Orion, though exceedingly strong and adept at his trade, wasn't very bright. This can easily be seen in the sky because Orion has two men standing directly on top of him, and he doesn't even seem to flinch. The two figures are Castor and Pollux, together called Gemini the Twins. Individually, the Twins are named for the bright stars marking their heads. From Castor, moving downward toward Orion, a stick man -- with long body and short legs -- can easily be seen. Likewise for Pollux, except he has a short body and long, graceful legs -- perhaps a one-time marathoner.

According to legend, Castor and Pollux were the twin sons of the god Zeus (Jupiter) and the mortal Leda; consequently, only one -- Castor -- was immortal. When Pollux died, Castor was devastated and begged his father to allow him to follow. From this a compromise was made: for about six months of the year, the Twins are alive in the sky, a sign that Pollux has once again joined the living. But then come six months when Castor must follow his brother to the netherworld, during which time the constellation is lost from our view. Then, when the weather again begins to chill, the Twins regain their prominent place in the sky.

In ancient times, the Twins were revered as guardians of sailors, who hoped that the invocation "by Gemini" would bring protection from the elements. That expression, slightly changed through the centuries, still exists. If you ever say "by Jimminy," you are calling up the powers of, not a famous cricket, but Castor and Pollux, Gemini the Twins. ■



Letters to the Editor

I think the Bulletin is great. My grandchildren use it to write reports in school. The schools should look into it.

Richard G. Sterkens
New Britain

Devote a page to critical letters, not back-slappers.

"The Connecticut Department of Environmental Protection is an equal opportunity agency that provides services, facilities, and employment opportunities without regard to race, color, religion, age, sex, physical or mental disability, national origin, ancestry, marital status, or political beliefs."

Get pros and cons on state environmental issues.

John Wraight Jr.
Ellington

■ *Good idea. Ed.*

Thanks for a well-done Bulletin. The high point for '85 was the DEP Conservation Officers, the men whom we see and appreciate.

H.F. Reller
Avon

The Citizens' Bulletin is the one magazine that is never left unread . . . informative, interesting, educational . . . a gem.

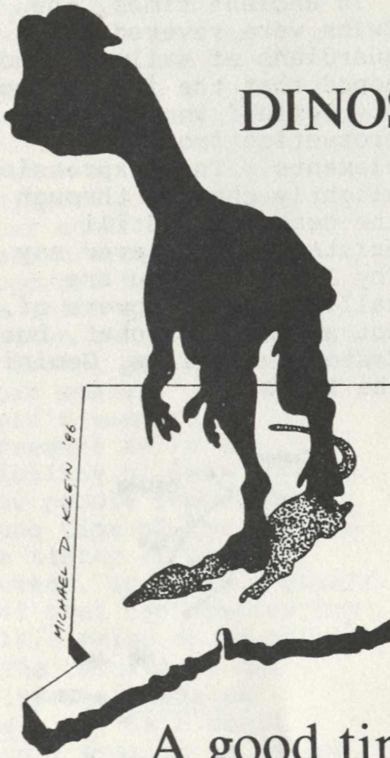
Pamela Edwards
Roxbury

Endnote

This grand show is eternal. It is always sunrise somewhere; the dew is never all dried at once; a shower is forever falling; vapor is ever rising. Eternal sunrise, eternal sunset, eternal dawn and gloaming, on sea and continents and islands, each in its turn, as the round earth rolls.

John Muir

In next month's Citizens' Bulletin . . .



DINOSAURS!

A good time to send a gift subscription

Please send a **Citizens' Bulletin** subscription to:

NAME: ____________________

ADDRESS: ____________________

TOWN: ____________________

STATE: __________ ZIP: __________

___$5/1 yr ___$9/2 yrs

NAME: ____________________

ADDRESS: ____________________

TOWN: ____________________

STATE: __________ ZIP: __________

___$5/1 yr ___$9/2 yrs

DEP Citizens' Bulletin
165 Capitol Ave., Rm. 112
Hartford, CT 06106

Gift card to read from: ____________________

DEP Citizens' Bulletin
State of Connecticut
Department of Environmental Protection
State Office Building
Hartford, Connecticut 06106

SECOND CLASS POSTAGE PAID
AT HARTFORD, CONNECTICUT